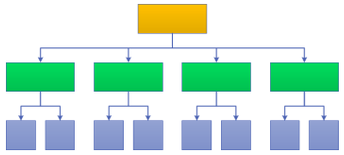
sPHENIX Project Controls

Irina Sourikova

Outline

- Introduction
- Integrated Project Tea

- Scope

- Schedule

- Cost

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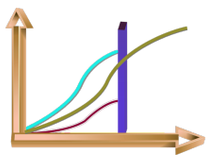
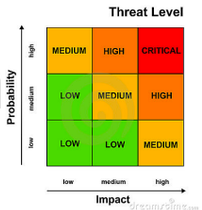

- Risk Managemen


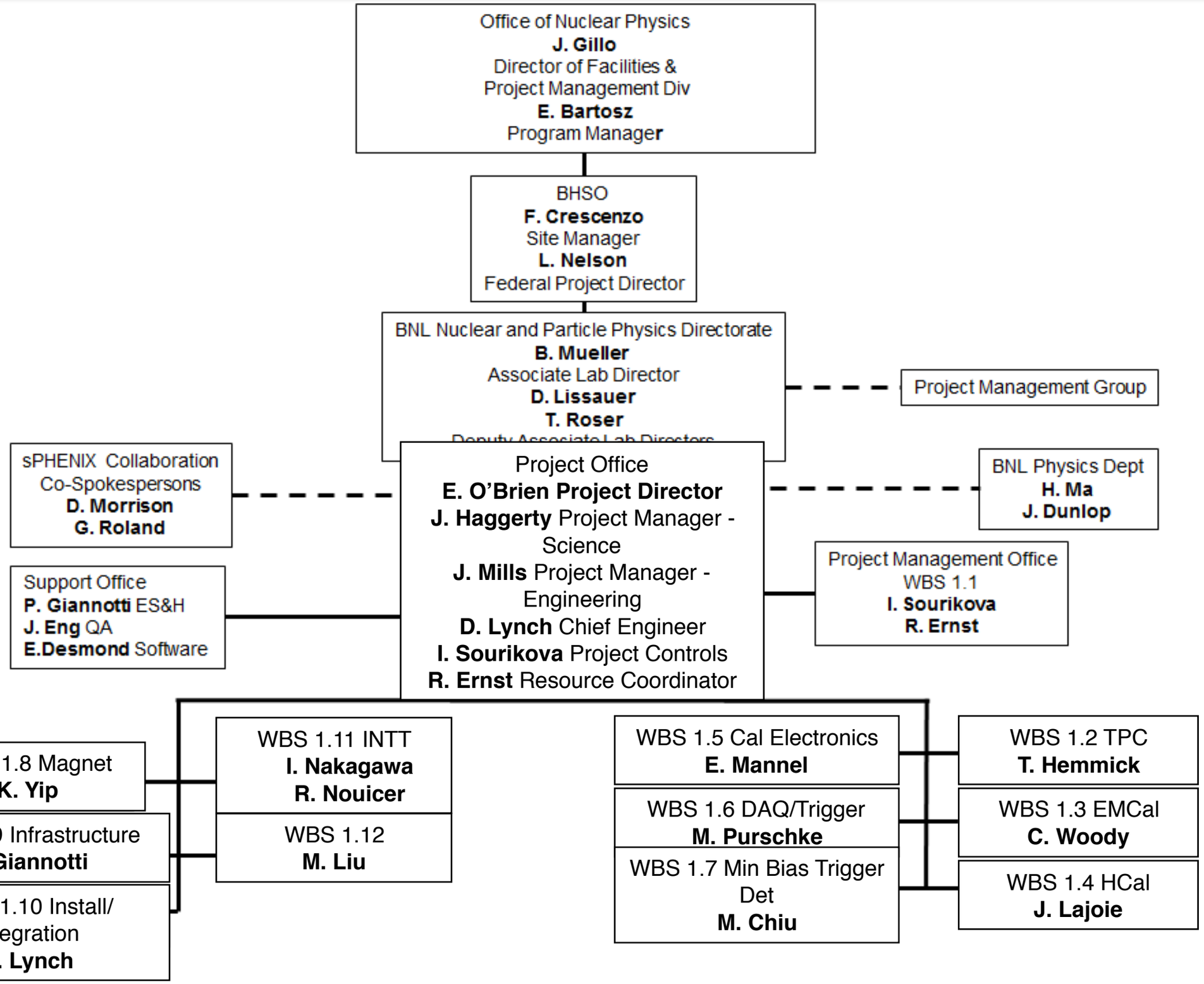
- PM Tools
- Summary

Introduction

<u>sPHENIX is a major upgrade to the PHENIX detector</u>.

- We are pre CD-1; a bottoms-up resource-loaded project plan has sPHENIX assembled, commissioned and ready to take data in January 2022.
- 10 countries, 62 institutions, 235 collaborators & growing
- 3rd collaboration meeting @ GSU Dec 2016

Integrated Project Team



Scope

WBS sPHENIX MIE Project Elements

1.1 Project Mangement

1.2 Time Projection Chamber

1.3 Electromagnetic Calorimeter

1.4 Hadronic Calorimeter

1.5 Calorimeter Electronics

1.6 DAQ & Trigger

1.7 Minimum Bias Trigger Detector

- Project represents the subsystem hardware purchase, fabrication, and assembly.
- Labor at BNL is deemed to be part of ongoing operations, except for explicit project management support.

WBS Infrastructure and Facility Upgrade

1.8 SC-Magnet

1.9 Infrastructure

1.10 Installation and Integration

WBS Parallel Activities

1.11 Intermediate Silicon Strip Tracker

1.12 MVTX

Scope: sPHENIX MIE WBS to L3

- 1 Management
- 2 TPC
  - Mechanics
  - GEM1
  - GEM2
  - GEM3
  - TPC FEE
  - TPC DAM
  - TPC Support
- 3 EMCal
  - Blocks
  - Modules & Sectors
- 4 HCal
  - Inner HCal
  - Outer HCal
- 5 CalElectronics
  - CalEl Optical Sensors
  - CalEl FEE
  - CalEl DAM
- 6 DAQ & Trigger
  - DAQ
  - Trigger
  - GL1
  - Timing System
- 7 MinBias

Deliverable-oriented decomposition of work that defines total scope of sPHENIX

Scope: WBS Dictionary

- What is in this WBS? What is NOT?
- Where are my cables??!

WBS	WBS	WBS L4	WBS L5	WBS Name	Dictionary Definition
1.1					
1.1				**SPHENIX PROJECT MANAGEMENT**	PROJECT MANAGEMENT FOR ALL SPHENIX WBS ITEMS FROM 1.2 TO 1.10 AND INCLUDING ALL PROJECT STAGES FROM CONCEPTUAL DESIGN TO CD-4 APPROVAL.
1.1	1.1.1			**Project Management of sPHENIX**	COST CONTENT: LABOR COST COVERING THE PROJECT MANAGEMENT TEAM. MATERIAL COSTS FOR TRAVEL OF THE MANAGEMENT TEAM OVER THE LIFE OF THE PROJECT. ADDITIONAL MATERIAL COSTS ASSOCIATED WITH PREPARATION FOR DOE AND BNL REVIEWS. THIS TASK INCLUDES ALL SCIENTIFIC, ENGINEERING, TECHNICAL AND SUPPORT STAFF EFFORTS TO PLAN AND SUPERVISE ALL ASPECTS OF THE ASSEMBLY, INTEGRATION AND INSTALLATION OF THE SPHENIX DEFINED IN WBS 1.2 THROUGH WBS 1.10. WORK STATEMENT: TASKS TO BE PERFORMED BY THE PROJECT MANAGEMENT TEAM INCLUDE: 1) THE OVERSIGHT AND MANAGEMENT OF THE DESIGN, CONSTRUCTION, INSTALLATION AND COMMISSIONING OF SPHENIX . 2) PREPARATION FOR DOE AND BNL REVIEWS INCLUDING CD REVIEWS BY OPA, DOE ANNUAL REVIEW, SAFETY REVIEWS, READINESS REVIEWS, ETC. 3)PREPARATION AND SUBMISSION OF ALL REPORTS AND DOCUMENTATION REQUIRED BY DOE AND BNL INCLUDING CONCEPTUAL AND TECHNICAL DESIGN REPORTS, EARNED VALUE REPORTS, ES&H PLANS, PROCUREMENT PLANS, ETC. 4) MONITORING THE ACTIVITIES OF ALL WBS TASKS THROUGH THE LEVEL2 MANAGERS TO ASSURE ASSURE ADHERENCE TO THE TECHNICAL, BUDGET AND SCHEDULE PLAN OF THE SPHENIX PROJECT. 5)WORK WITH THE LEVEL2 MANAGERS TO MONITOR ALL VENDOR ACTIVITY TO ASSURE COMPLIANCE WITH TECHNICAL, BUDGET AND SCHEDULE SPECS.
1.1	1.1.2			**Travel for sPHENIX Project Management**	TRAVEL TO FACILITATE ACTIVITIES INCLUDED IN WBS 1.1.1
1.2					
1.2				**SPHENIX TPC**	The Time Projection Chamber for the sPHENIX Experiment at RHIC
1.2	1.2.1			**TPC Mechanics**	TECHNICAL SCOPE: THIS ITEM CONTAINS ALL TASKS WHICH ARE REQUIRED TO IDENTITY COMPONENTS FOR THE TPC PROTOTYPE VERSION 1/2, PERFORM R&D, DESIGN AND CONSTRUCT THE ELEMENTS OF THESE PROTOTYPES AND THE FINAL TPC INCLUDING THE HV SYSTEM. WORK STATEMENT: PROVIDE PROTOTYPES: V1/2 FIELD CAGE PROTOTYPE; V1/2 MODULE PROTOTYPING, INCLUDING GAS ENCLOSURE, COMMON MODULE MECHANICS, MODULE PROTOTYPE, V2 FIELD CAGE MODIFICATIONS, SITE PREP FOR PRODUCTION FACTORIES.
1.2	1.2.1	1.2.1.1		**TPC v1 Field Cage Prototype**	TECHNICAL SCOPE: THIS ITEM CONTAINS ALL TASKS WHICH ARE REQUIRED TO IDENTITY COMPONENTS FOR THE TPC FIELD CAGE PROTOTYPE VERSION 1, PERFORM R&D, DESIGN AND CONSTRUCT THE ELEMENTS OF THIS PROTOTYPE.WORK STATEMENT: PROVIDE PROTOTYPE: FIELD CAGE V1 PROTOTYPE.
1.2	1.2.1	1.2.1.2		**TPC v2 Field Cage**	TECHNICAL SCOPE: THIS ITEM CONTAINS ALL TASKS WHICH ARE REQUIRED TO IDENTITY COMPONENTS FOR THE TPC FIELD CAGE PROTOTYPE VERSION 2, PERFORM R&D, DESIGN AND CONSTRUCT THE ELEMENTS OF THIS PROTOTYPE. WORK STATEMENT: PROVIDE PROTOTYPE: FIELD CAGE V2 PROTOTYPE.
1.2	1.2.1	1.2.1.3		**TPC Final Field Cage**	TECHNICAL SCOPE: THIS ITEM CONTAINS ALL TASKS WHICH ARE REQUIRED TO IDENTITY COMPONENTS FOR THE TPC FINAL FIELD CAGE, PERFORM NECESSARY MODIFICATION TO THE V2 FIELD CAGE. WORK STATEMENT: PROVIDE PROTOTYPES: MODIFY V2 FIELD CAGE PROTOTYPE AND TESTING, INCLUDING PROCURING PARTS THAT HAVE BEEN DEVELOPED DURING PROTOTYPING.
1.2	1.2.1	1.2.1.4		**TPC v1 Modules**	TECHNICAL SCOPE: THIS ITEM CONTAINS ALL TASKS WHICH ARE REQUIRED TO IDENTITY COMPONENTS FOR THE GEM READOUT MODULE PROTOTYPE VERSION 1, DESIGN AND CONSTRUCT THE ELEMENTS OF THIS PROTOTYPE. WORK STATEMENT: PROVIDE GEM READOUT MODULE V1 PROTOTYPE AND MATERIAL/EQUIPMENT TO PRODUCE THE MODULES

Schedule

- MS Project has been used by the individual subsystem managers to develop their schedules.

L2 managers:

✓ Defined activities

✓ Sequenced activities

✓ Estimated activity resources

✓ Estimated activity duration

✓ Planned reviews for every stage

PM + L2 managers:

✓ Established milestone list

✓ Evaluated activity relationships

✓ Built sPHENIX schedule

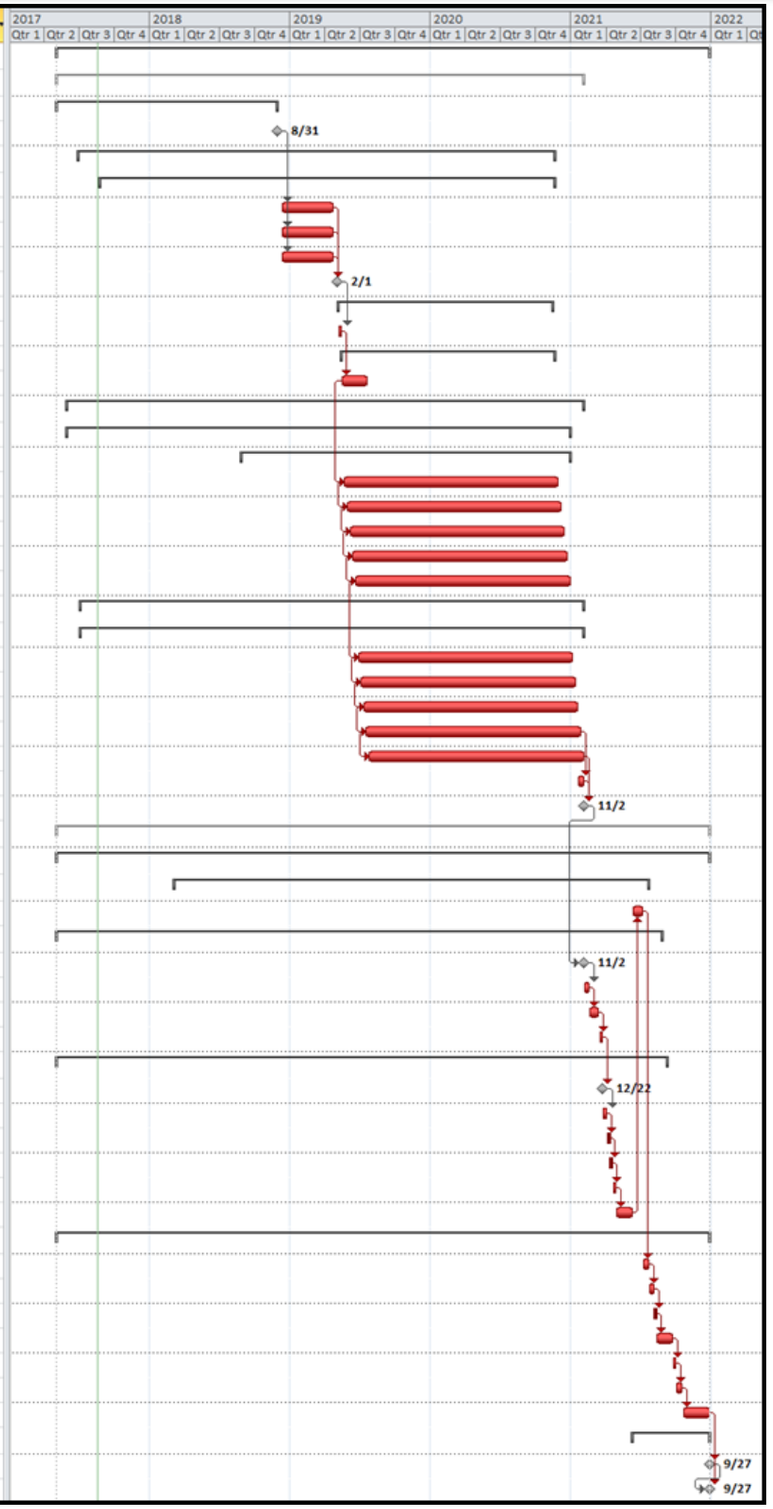
✓ Incorporated project float

✓ Analyzed critical path

- First round of scrubbing activities and logic reconciliation has been perform

Schedule: Critical Path

WBS	Task Name	Duration	Start	Finish
1	sPHENIX_Project	1161 days?	2/1/17	9/27/21
1.3	sPHENIX_EMCal	938 days	2/1/17	11/2/20
1.3.1	EMCAL Management	396 days	2/1/17	8/31/18
1.3.1.5	CD-2b/CD-3b Authorization	0 days	8/31/18	8/31/18
1.3.2	EMCAL Block Production	847 days	3/31/17	8/21/20
1.3.2.3	EMCAL Final Block Production	808 days	5/25/17	8/21/20
1.3.2.3.7	Order & deliver epoxy for final blocks	90 days	9/10/18	1/22/19
1.3.2.3.8	Order parts and fabricate mold parts for final blocks	90 days	9/10/18	1/22/19
1.3.2.3.9	Set up factory for final blocks	90 days	9/10/18	1/22/19
1.3.2.3.12	Readiness and Safety Review for final block production	8 days	1/23/19	2/1/19
1.3.2.3.13	Fabricate final blocks	384 days	2/4/19	8/14/20
1.3.2.3.13.1	Fabricate final blocks sector 1	6 days	2/4/19	2/11/19
1.3.2.3.14	Pack and ship final blocks to BNL	383 days	2/12/19	8/21/20
1.3.2.3.14.1	Pack and ship final blocks for sectors 1-8 to BNL	48 days	2/12/19	4/19/19
1.3.3	EMCAL Module Production and Sector Assembly	919 days	3/1/17	11/2/20
1.3.3.2	EMCAL Module Production	894 days	3/1/17	9/28/20
1.3.3.2.3	EMCAL Final Module Production	583 days	5/29/18	9/28/20
1.3.3.2.3.6	Receive, unpack, log & inspect final blocks	384 days	2/19/19	8/28/20
1.3.3.2.3.7	Install light guides on final blocks	384 days	2/26/19	9/4/20
1.3.3.2.3.8	Install reflectors and mounting supports on final blocks	384 days	3/5/19	9/14/20
1.3.3.2.3.9	Install SiPMs & daughterboards on final blocks	384 days	3/12/19	9/21/20
1.3.3.2.3.10	Glue final blocks together into modules	384 days	3/19/19	9/28/20
1.3.3.3	EMCAL Sector Assembly	896 days	4/3/17	11/2/20
1.3.3.3.3	EMCAL Final Sector Assembly	896 days	4/3/17	11/2/20
1.3.3.3.3.11	Install modules in final sectors	384 days	3/26/19	10/5/20
1.3.3.3.3.12	Install readout electronics on final sectors	384 days	4/2/19	10/12/20
1.3.3.3.3.13	Install cables & cooling system on final sectors	384 days	4/9/19	10/19/20
1.3.3.3.3.14	Test final sectors with LEDs & cosmic rays	384 days	4/16/19	10/26/20
1.3.3.3.3.15	Repair or rework any sectors as required	384 days	4/23/19	11/2/20
1.3.3.3.3.16	Installation Readiness Review	10 days	10/20/20	11/2/20
1.3.4	Install sectors into sPHENIX	0 days	11/2/20	11/2/20
1.10	sPHENIX_Integration_and_Installation	1161 days	2/1/17	9/27/21
1.10.2	Integration Management & Technical Coordination, Installation Tooling & Fixtures & Subsystem Installation	1161 days	2/1/17	9/27/21
1.10.2.2	Infrastructure Installation	841 days	12/4/17	4/20/21
1.10.2.2.3	Install Beampipe/Vacuum/Bakeout	20 days	3/10/21	4/6/21
1.10.2.7	EMCal Installation	1076 days	2/1/17	5/25/21
1.10.2.7.7	EMCal Sectors Ready for Installation	0 days	11/2/20	11/2/20
1.10.2.7.8	Transport Assembled EMCal Sectors to AH	10 days	11/3/20	11/17/20
1.10.2.7.9	Install EMCal Sectors	16 days	11/18/20	12/11/20
1.10.2.7.10	Align/Survey EMCal to SC Magnet Centerline	7 days	12/14/20	12/22/20
1.10.2.8	TPC Installation	1086 days	2/1/17	6/9/21
1.10.2.8.7	TPC Ready for Installation	0 days	12/22/20	12/22/20
1.10.2.8.8	Transport Assembled TPC Sections to AH	5 days	12/23/20	12/31/20
1.10.2.8.9	Install TPC Support	5 days	1/4/21	1/8/21
1.10.2.8.10	Install TPC (Mechanical)	5 days	1/11/21	1/15/21
1.10.2.8.11	Align/Survey TPC to SC Magnet Centerline	5 days	1/19/21	1/25/21
1.10.2.8.12	Install TPC Cables and Services	30 days	1/26/21	3/9/21
1.10.2.11	Min Bias Installation	1161 days	2/1/17	9/27/21
1.10.2.11.9	Install Min Bias Support	10 days	4/7/21	4/20/21
1.10.2.11.10	Install Min Bias (mechanical)	10 days	4/21/21	5/4/21
1.10.2.11.11	Align/Survey Min Bias to SC Magnet Centerline	5 days	5/5/21	5/11/21
1.10.2.11.12	Install Min Bias Cables and Services	30 days	5/12/21	6/23/21
1.10.2.11.13	Review Min Bias for Operational Readiness (ORR)	5 days	6/24/21	6/30/21
1.10.2.11.14	Address Action Items from Min Bias ORR	10 days	7/1/21	7/16/21
1.10.2.11.15	Commission Min Bias	50 days	7/19/21	9/27/21
1.10.2.12	sPHENIX Full Detector Installation	140 days	3/10/21	9/27/21
1.10.2.12.9	All Design/Safety/Readiness Reviews Complete, sPHENIX Ready for Operations	0 days	9/27/21	9/27/21
1.10.9	sPHENIX Ready for Run 1	0 days	9/27/21	9/27/21



Schedule: Primavera P6

WBS Code	WBS Name
SP	SPHENIX
SP.M	SPHENIX Milestones
SP.1.1	Management
SP.1.2	TPC
SP.1.2.1	TPC Mechanics
SP.1.2.2	TPC R1 Modules
SP.1.2.3	TPC R2 Modules
SP.1.2.4	TPC R3 Modules
SP.1.2.5	TPC FEE
SP.1.2.6	TPC DAM
SP.1.2.7	TPC Support
SP.1.3	EMCal
SP.1.3.1	EMCAL Block Production
SP.1.3.2	EMCAL Module Production and Sector Assembly
SP.1.4	HCal
SP.1.4.1	Inner HCal
SP.1.4.2	Outer HCal
SP.1.5	CalEl
SP.1.5.1	Optical Sensors
SP.1.5.2	Calorimeter Front End Electronics
SP.1.5.3	Calorimeter Digitizer System
SP.1.6	DAQ&Trigger
SP.1.6.1	DAQ
SP.1.6.2	Trigger
SP.1.6.3	Global Level 1 (GL1)
SP.1.6.4	Timing System
SP.1.7	MinBias Detector

Cost: BOE

- Bottom-up cost and contingency estimates performed by L2 and L3 managers.
- BOE format is hierarchical:
  - 1 excel file per each WBS L3 element; Navigation tab has links to all L4 elements.
  - Each WBS L4 element has 2 tabs: Summary and Details
- All excel tabs have standard format except for the Details, which is tailored to WBS L

sPHENIX Detector
Relativistic Heavy Ion Collider
BASIS of ESTIMATE (BoE)

L2 Project Name	L2 WBS Number	L3 Project Name (Control Account)	L3 WBS Number
Time Projection Chamber	1.2	TPC Mechanics	1.2.1

Work Package Name	WBS Number	Basis of Estimate Link
TPC v1 Field Cage Prototype	1.2.1.1	TPC v1 Field Cage Prototype
TPC v2 Field Cage	1.2.1.2	v2 Field Cage-Summary
TPC Final Field Cage	1.2.1.3	Final Field Cage-Summary
TPC v1 Modules	1.2.1.4	v1 Modules-Summary
TPC v2 Modules	1.2.1.5	v2 Modules-Summary
TPC Production GEM Acquisition	1.2.1.6	GEM Acquisition-Summary
TPC High Voltage System	1.2.1.7	High Voltage System-Summary
TPC Assembly	1.2.1.8	Assembly-Summary

SPHENIX TPC	The Time Projection Chamber for the sPHENIX Experiment at RHIC
TPC Mechanics	TECHNICAL SCOPE: THIS ITEM CONTAINS ALL TASKS WHICH ARE REQUIRED TO IDENTITY COMPONENTS FOR THE TPC PROTOTYPE VERSION 1/2, PERFORM R&D, DESIGN AND CONSTRUCT THE ELEMENTS OF THESE PROTOTYPES AND THE FINAL TPC INCLUDING THE HV SYSTEM. WORK STATEMENT: PROVIDE PROTOTYPES: V1/2 FIELD CAGE PROTOTYPE; V1/2 MODULE PROTOTYPING, INCLUDING GAS ENCLOSURE, COMMON MODULE MECHANICS, MODULE PROTOTYPE, V2 FIELD CAGE MODIFICATIONS, SITE PREP FOR PRODUCTION FACTORIES.

Cost: BOE Summary tab

	sPHENIX Detector Relativistic Heavy Ion Collider BASIS of ESTIMATE (BoE)	Date of Est:	3/1/17
		Prepared By:	E.J. Mannel
		DocNo. (refer Rev.	DocDB-65

Work Package Name:	WBS Number:	Control Account Number
Sensor Procurement	1.5.1	

WBS Dictionary Definition:

This work packages covers the procurement and Q/A testing of the preproduction and production optical sensors for the EMCal and HCal detectors.

Estimate Type (check all that apply):

	Work Complete
	Existing Purchase Order
	Catalog Listing or Industrial Construction Database
X	Documented Vendor Quotation based on Drawings/Sketches/Specifications
X	Budgetary Estimate by Vendor/Fabricator based on Sketches, Drawings, or other Written Correspondence
x	Engineering Estimate based on Similar Items or Procedures
	Engineering Estimate based on Analysis
X	Expert Opinion

Supporting Documents (including but not limited to):

Task Summary
Costing

Assumptions Used in Developing Estimate

The following assumptions were used in the estimate: 1) Vendor quote for purchase of preproduction sensors. 2) Vendor budgetary quotation for production sensors. 3) Engineering estimate for test equipment based on equipment already built. 3) University labor is contributed. 4) BNL labor is for submission of orders and tracking delivery.

Details of the Base Estimate (explanation of the Work)

This work package covers the procurement and Q/A of all optical sensors for the proproduction and production rounds for the EMCal and HCal detectors. Procurement includes writing design specifications, obtaining quotes, placing orders and tracking delivery. Testing includes measuring the operational characteristics of the device and sorting the devices to meet the performace specifications of the HCal and EMCal detectors.Deliverables are all the required sensors for EMCal and HCal, fully testedf and sorted to meet the assembly requirements for the EMCal and HCal.

Cost Summary

(follow link for detailed summary)

Task	Cost Basis	Total	Total Cost + Contingency
Optical Sensor:Preproduction	Quote	25,500.00	25,500.00
Optical Sensor:Production	Budget Quot	1,048,396.80	1,467,755.52
Test Stand	Engineering Es	22,000.00	15,400.00
Total Cost		095,896.80	1,508,655.52

EVMS: CAMs & Control Accounts

- Management — I. Sourikova
- TPC — T. Hemmick
  - Mechanics — K. Dehmelt
  - GEM1 — S. Milov
  - GEM2 — V. Green
  - GEM3 — V. Riabov
  - TPC FEE — T. Sakaguchi
  - TPC DAM — J. Huang
  - TPC Support — R. Pisani
- EMCal — C. Woody
  - Blocks — A. Sickles
  - Modules & Sectors — S. Stoll
- HCal — J. Lajoie
  - Inner HCal — J. Lajoie
  - Outer HCal — A. Gordeev
- CalElectronics — E. Mannel
  - CalEl Optical Sensors — C. Aidala
  - CalEl FEE — S. Boose
  - CalEl Digitizers — CY Chi
- DAQ & Trigger — M. Purschke
  - DAQ — E. Desmond
  - Trigger — J. Nagle
  - GL1 — E. Desmond
  - Timing System — M. Purschke
- MinBias — M. Chiu

Control Accounts at WBS L3 level
- 1 WBS element per CA
- 1 Organization per CA

EVMS

- sPHENIX PM and CAMs are EVMS trained.
- A P-6 transition plan is in place which will allow for a certified EVMS system to be in place 3 month prior to CD-2.
- Primavera P6 will be used for schedule management and Cobra for EVMS calculations and reporting.

Risk Management: RMP

Table of Contents

Risk Management: Risk Registry

Owner	WBS	Risk Name	Risk trigger (if)	Consequences (then)	Timeframe	Probability	Impact	Rank	Mitigation Plan
S. Stoll	1.3 EmCal	Loss of primary production site for blocks (University of Illinois Urbana Champaign	UIUC decides to not fabricate the absorber blocks	Would cause a delay in schedule and a significant increase in labor resources required to build the blocks at BNL.	production	Low 20%	High cost: schedule: 12 mo. Delay	Low	Blocks would have to be built at BNL. However, we would loose scientific oversight provided by UIUC, student labor, free use of facilities, space, etc.
S. Stoll	1.3 EmCal	Cannot find cost effective solution for making light guides	R&D studies and beam tests do not lead to improvements in the light collection uniformity from the modules	Will require position dependent correction for obtaining the desired energy resolution from the detector	R&D phase	Moderate 60%	Low - scope: possibly reduced energy resolution.	Moderate	We are investigating both injection molding and casting of light guides. Several companies have been identified. Injection molding has been shown to produce encouraging results but with low yield.
J. Lajoie	1.4 HCal	Loss of scintillating tile provider (Uniplast)	Uniplast is unable to engage in or complete the production contract	Schedule delay in the procurement of the scintillating tiles, along with correspond delays in inner and outer HCAL assembly.	production	10%	Schedule: 6-9 months	Moderate	Explore alternate scintillator vendors (FNAL, Elgin).
J. Lajoie	1.4 HCal	Unable to produce inner HCAL in SS310 in a cost effective manner	Evaluation of inner HCAL prototype yields higher than anticipated production costs	Schedule delay in finalizing the design of the inner HCAL; re-engineering required.	production	25%	Schedule: 6 months	Moderate	Investigate value-engineering designs and alternate materials (brass); will require re-engineering.
J. Lajoie	1.4 HCal	Unable to identify suitable site(s) for inner HCAL assembly (scint. and electronics)	No participating University site can identify the space resources for assembly.	Schedule delay to set up assembly site at BNL	production	5%	Schedule 3 months	Low	Investigate possibility of assembly (scintillator and electronics) at BNL.
E. Mannel	1.5 Cal Electronics	Delay in SiPM Delivery	SiPM order not placed on schedule or vendor unable to meet production schedule	Delay in assembly of HCal and EmCal SiPM daughter boards. Potential delay in HCal and EMCal module assembly	Procurement	Moderate: 50%	Low: Schedule delay 2-3 months	Low	Closely monitor the procurement stage.
E. Mannel	1.5 Cal Electronics	Delay in testing of SiPMs	SiPM Delivery not placed on schedule or vendor unable to meet prodcution schedule	Delay in assembly of HCal and EMCal SiPM daughter boards. Potential delay in HCal and EMCal module assembly	Production	Moderate: 50%	Low: Schedule delay 2-3 months	Low	Increase number of testing stations. Identify additional collaborators who can contribute to the testing program. Streamline testing program.
E. Mannel	1.5 Cal Electronics	Delay in Assembly of HCal Daughter boards, Preamps, Interface boards, LED Drivers	Procurement of components, issuing of orders.	Potential delay in HCal module assembly and testing	Production	Moderate: 25%	Low: Schedule delay 2-3 months	Low	Staged partial deliveries of boards. Use multiple assembly houses
E. Mannel	1.5 Cal Electronics	Delay in assembly of EMCal Daughter boards, Preamps or Interface boards	Procurement of components, issuing of orders.	Potential delay in EMCal module assembly and testing	Production	Moderate: 25%	Low: Schedule delay 2-3 months	Low	Staged partial deliveries of boards. Use multiple assembly houses

PM Tools: DocDB

List of Topics

[DocDB Home] [Administer] [New] [Search] [Last 20 Days] [List Authors] [List Topics] [List Events] [Help]

CD1 Review

- Basis Of Estimates
  - 1.10 BOE Integration and Installation
  - 1.11 INTT BOE
  - 1.2 BOE TPC
    - 1.2.1 TPC Mechanics
    - 1.2.2 TPC GEM R1
    - 1.2.3 TPC GEM R2
    - 1.2.4 TPC GEM R3
    - 1.2.5 TPC FEE
    - 1.2.6 TPC DAM
    - 1.2.7 TPC Support (Gas, laser, cooling)
  - 1.3 BOE EmCal
    - 1.3.1 EmCal Blocks
    - 1.3.2 EmCal Modules and Sectors
  - 1.4 BOE HCal
    - 1.4.1 Inner HCal
    - 1.4.2 Outer HCal
  - 1.5 BOE CalEl
    - 1.5.1 CalEl Optical Sensors
    - 1.5.2 CalEl FEE
    - 1.5.3 CalEl Digitizers
  - 1.6 BOE DAQ/Trigger
    - 1.6.1 DAQ
    - 1.6.2 Trigger
    - 1.6.3 GL1
    - 1.6.4 Timing System
  - 1.7 BOE MinBias
  - 1.8 BOE Magnet
  - 1.9 BOE Infrastructure
    - 1.9.1 Infrastr. Mgmt
    - 1.9.2 Mechanical Systems
    - 1.9.3 Detector Support
    - 1.9.4 Facility Support
- MS Project Files for CD1
- NEPA forms
- Risk Register
- Templates, references
- WBS Dictionary

Cost

- BOE Nov 2015

Detectors
Electronics
Guidelines
Mechanics
R and R
Resolutions
Risk Management Plan
Schedule
Science

PM Tools: Comment Resolution DB (1)

Status display. All columns are sortable. ID is a link to edit.

ID	Status (by L2)	Approval by PMT	WBS	WBS name	Originating Review	Recommendation	Originator	Responsible	Resolution Comment	Resolved on	Link	Last Updated	Note	Fiscal Year	Level	Assigned on
96	Closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Seek CD-3a approval for early procurement right after (or at the same time as) CD-1 approval for long lead items that have realized sufficient design completion and maturity.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	A project plan including a CD-3a at the time of CD-1 has been developed and presented to DOE Feb 2, 2016. It will be linked io the Project file in docdb	2016-02-22		2016-02-22		2016	Internal	2015-11-10
97	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Ensure that there is sufficient float explicitly indicated in the schedule to properly plan for CD-3a. Modify/reduce durations of the prototype tasks, where appropriate, to best reflect the actual time thought to be needed to accomplish the tasks.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	8 months of schedule float has been added.	2015-12-10		2015-12-10		2016	Internal	2015-11-10
98	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Add milestones for technical decisions and down-select of alternatives.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	INTT is now an off-project deliverable from Japan	2016-01-11		2016-01-11		2016	Internal	2015-11-10
99	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Expand the resource breakdown structure (RBS) to include other flavors of university resources that might be assigned to the project beyond just “uncosted students”. These could include both costed and uncosted resources (e.g. university engineers, technicians, paid undergraduate labor, uncosted post-docs/grad students/scientist faculty), as necessary. As the RBS is developed, allow for the possibility of resources from multiple institutions (i.e., universities and/or other national laboratories), each with their own rates and burdens.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	RBS expanded to include non-BNL labor	2016-01-11	LINK	2016-01-11		2016	Internal	2015-11-10
100	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	At this relatively early stage of project planning, develop a schedule and cost profile that has as its primary focus the project’s needs and technical requirements, with a secondary focus on the available funding profile.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	L2 and L3 managers developed bottom up resource estimates	2017-05-30	LINK	2017-05-30		2016	Internal	2015-11-10
101	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Develop the resource-loaded schedule (RLS) to include scope that will be funded by other sources, with appropriate task funding codes to identify the sources.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	All MIE items funded by DOE. INTT is in-kind contribution from Japan.	2016-01-11		2016-01-11		2016	Internal	2015-11-10
102	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Re-evaluate the risks associated with off-project activities and factor them into the contingency considerations.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	Support WBS is a part of Risk Register.	2016-11-15	LINK	2016-11-15		2016	Internal	2015-11-10
103	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Make a considered estimate of the off-project costs to fully inform upper management of the support needed to carry out the project successfully.	SC-5 Cost and Schedule, X. Guo, Chair	E. O'Brien	BOEs include detailed labor estimates.	2016-11-17	LINK	2016-11-17		2016	Internal	2015-11-10
104	closed	closed - EO'B	1.1	Management	BNL ALD Cost and Schedule Review	Consider moving the project schedule into Primavera as early as possible.	SC-5 Cost and Schedule, X. Guo, Chair	I. Sourikova	I.Sourikova and R.Grubb created P6 schedule and finalize codes for EVMS reporting	2017-05-26		2017-05-26	P6 license purchased on 02/18/2016	2016	Internal	2015-11-10

PM Tools: Comment Resolution DB (2)

Edit interface

Edit Recommendation number 99

Status by L2	closed
Approval by PMT	closed - EO'B
WBS	1.1
WBSname	Management
Review_title	BNL ALD Cost and Schedule Review
Recommendation	Expand the resource breakdown structure (RBS) to include other flavors of university resources that might be assigned to the
Originator	SC-5 Cost and Schedule, X. Guo, Chair
Responsible	E. O'Brien
Resolution_comment	RBS expanded to include non-BNL labor
Link to document	https://docdb.sphenix.bnl.gov/cgi-bin/private/ShowDocument?docid=27
Note	

Assigned 2015-11-10 **Resolved** 2016-01-11

Submit your updates

Summary

- sPHENIX team has been very busy preparing for CD-1 and EVMS

- We have a detailed plan, certified tools, great team, and are ready for CD-1 approval.

- Thank you for helping us prepare for this important milestone.

Backup

Table of Labor risk rules

	Type of Estimate	Contingency %	Description
L1	Actual	0%	Actual costs incurred on activities completed to date.
L2	Level of Effort Tasks	0%–20%	Support type activities that must be done to support other work activities or the entire project effort, where estimated effort is based on the duration of the activities it is supporting.
L3	Advanced	10%–25%	Based on experience with documented identical or nearly identical work. Development of activities, resource requirements, and schedule constraints are highly mature. Technical requirements are very straightforward to achieve.
L4	Preliminary	25%–40%	Based on direct experience with similar work. Development of activities, resource requirements, and schedule constraints are defined as preliminary (beyond conceptual) design level. Technical requirements are achievable and with some precedent.
L5	Conceptual	40%–60%	Based on expert judgment using some experience as a reference. Development of activities, resource requirements, and schedule constraints are defined at a conceptual level. Technical requirements are moderately challenging.
L6	Pre-conceptual	60%–80%	Based on expert judgment without similar experience. Development of activities, resource requirements, and schedule constraints are defined at a pre-conceptual level. Technical requirements are moderately challenging.
L7	Rough Estimate	80%–100%	Based on expert judgment without similar experience. Development of activities, resource requirements, and schedule constraints is largely incomplete. Technical requirements are challenging.
L8	Beyond state of the art	> 100%	No experience available for reference. Activities, resource requirements, and schedule constraints are completely undeveloped. Technical requirements are beyond state of the art.

Table of Materials risk rules

Code	Type of Estimate	Contingency %	Description
M1	Existing Purchase order	0%	Items have been completed or obligated. (Note: Contact Change Orders are considered a Risk and should not be included)
M2	Procurement for LOE/ Oversight work	0%–20%	M&S items such as travel, software purchases and upgrades, computers, etc. estimated to support LOE efforts and other work activities.
M3	Advanced	10%–25%	Items for which there is a catalog price or recent vendor quote based on a completed or nearly completed design or an existing design with little or no modifications and for which the costs are documented.
M4	Preliminary	25%–40%	Items that can be readily estimated from a reasonably detailed but not completed design; items adapted from existing designs but with moderate modifications, which have documented costs from past projects. A recent vendor survey (e.g., budgetary quote, vendor RFI response) based on a preliminary design belongs here.
M5	Conceptual	40%–60%	Items with a documented conceptual level of design; items adapted from existing designs but with extensive modifications, which have documented costs from past projects.
M6	Pre-conceptual – Common work	60%–80%	Items that do not have a documented conceptual design, but do have documented costs from past projects. Use of this estimate type indicates little confidence in the estimate. Its use should be minimized when completing the final estimate.
M7	Pre-conceptual – Uncommon work	80%–100%	Items that do not have a documented conceptual design, and have no documented costs from past projects. Its use should be minimized when completing the final estimate.
M8	Beyond state of the art	> 100%	Items that do not have a documented conceptual design, and have no documented costs from past projects. Technical requirements are beyond the state of the art.